The Ether Drag Show

Jaume Navarro, ed., *Ether and Modernity: The Recalcitrance of an Epistemic Object in the Early Twentieth Century*, Oxford: Oxford University Press, 2018, 272 pp., $85.00 (hardback).

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History often proceeds by tug of war between continuity and discontinuity. One generation of historians recognizes a sharp disjunction; the next responds by emphasizing the threads of stability that span it. *Ether and Modernity: The Recalcitrance of an Epistemic Object in the Early Twentieth Century* drags the historiography of early twentieth-century physics back toward the side of continuity. Most accounts of this era emphasize the swift, sharp shifts relativity and quantum mechanics represented. While in no way denying the import of those transitions, the essays collected here share a conviction that the categories "classical" and "modern" are too dichotomous to capture the richness of scientific practice and its popular image during this era of foment.

The vehicle the editor (Jaume Navarro, University of the Basque Country, Spain) selects to make this point is the luminiferous ether—the purported medium through which electromagnetic waves must travel. Standard histories of physics are wont to cast Albert Einstein as St. George, striking the monstrous ether dead with a thrust from the spear of special relativity. The central contention motivating this volume is that this story, much like that of St. George, is apocryphal. Perhaps we now regard the ether, like the dragon, a fantastical contrivance of the imagination, but that did not make it any easier to kill. The ether, that is, had a rich life as both a scientific and a cultural object before relativity supposedly stripped it of physical meaning, and that life continued largely uninterrupted through the early twentieth century.

Eleven essays, in addition to a thorough introduction (co-authored by Navarro and Massimiliano Badino), document that life. It is clear from these contributions that the ether had a lively cultural existence that extended well into the 1930s, and that exploring that life can reveal much about the broader history of science in the early twentieth century. The contributions will be accessible to anyone initiated into the history of science and the glossy paper stock is both easy on the eyes and a fine showcase for the lovely color illustrations that grace a few of the entries. These features go some way toward explaining the high cost of the volume. (Readers might nevertheless wonder whether the price tag is justified when they encounter occasional dangling modifiers and other minor wrinkles that reputable presses used to pride themselves on ironing out in production. It is a rare book these days that does not invite us to rage against the dying of that particular light.)

Central to a number of the contributions is Oliver Lodge, the great popularizer of the ether in the Anglophone world. Analyses of his popular writings from the 1910s and 1920s, provided by Imogen Clark and Michael H. Whitworth, show how the ether figured in the account of modern physics Lodge framed for public audiences, and discuss what sort of audiences he himself must have had in mind. Linda Dalrymple Henderson, in a beautifully illustrated entry, discusses the ether's persistence in the Italian futurist movement, offering concrete evidence that such public-facing discussions of the ether resonated with at least one audience.

These contributions collectively make a powerful historiographical point: when we attempt to characterize the science of an era, we can easily miss a trick by tracing only the leading edge of

scientific inquiry. Its center of mass might map out a markedly different trajectory. Such is the case of the ether in the early twentieth century. If we track only the very latest developments in relativity theory, it might seem moribund. But for science as a broader cultural enterprise, it remained a core concept, one consumers of popular scientific media would be expected to greet with a nod of familiarity.

This volume, though, does not only aim to show only that the ether was a resilient concept; it also seeks to explain that resilience. It does so by considering the ether as a recalcitrant *epistemic* object, implying the provocative claim that it continued to do serious work toward the development of scientific knowledge after the advent of relativity. The contributions directed toward this aim are of three types: those considering the work of those contemporaries of Einstein who were less ready than he to abandon the ether; those examining the ether's continued presence in physics after 1905; and those examining the use of the ether concept beyond physics.

Contributions engaging Einstein's contemporaries include those of Connemara Doran and Scott A. Walter, each of which focuses on Henri Poincare and suggests that his conventionalism offered a role for the ether after Einstein, even if only a heuristic one. Richard Staley examines the aesthetic sensibilities both Einstein and Ernst Mach brought to their physics, suggesting that Einstein's later receptiveness to something like a general-relativistic ether is explicable in terms of those sensibilities. These essays drive home the point that the ether was not dead simply because Einstein said it was. It was naturally difficult for a generation of physicists who had grown up with the ether as a foundational element of their metaphysics to jettison it forthwith. But, following Einstein's judgment that the either was "superfluous," did it prove epistemically potent for new or ongoing scientific enterprises?

Essays focusing on both physics and other sciences demonstrate amply that it was *used*, but it is less clear to what extent that it was epistemically *useful*. Arne Schirrmacher, for instance, tackles the difficult case of Philipp Lenard, the Nobel Prize winner and exponent of *Deutsche Physik*, whose unwavering support for the ether is impossible to fully disentangle from his professional frustrations, personal animosities, and clear anti-Semitism. Roberto Lalli takes a bibliometric approach to reveal the persistence of the ether in American physics journals, where it was kept current by Dayton C. Miller's post–1919 repetitions of the Michaelson–Morley experiments, the positive results of which were ultimately shown to be erroneous. Finally, Aaron Sydney Wright documents Paul Dirac's idiosyncratic and ultimately unsuccessful attempt in the 1950s to resuscitate the ether in response to some difficulties in quantum electrodynamics. The ether's afterlife in physics, in other words, was a ghostly one.

What of its afterlife outside of physics? Oliver Lodge reappears again in Richard Noakes's discussion of the ether in his psychical research. The conceptual possibilities the ether offered, along with Lodge's savoir faire with popular audiences, brought paranormal phenomena to the cusp of scientific respectability in the first decades of the twentieth century—but it would never quite seize it. The most compelling case for the ether's continued utility comes from Navarro, who shows how telegraph engineers made continued use of the ether concept well into the 1930s, a fact he uses to advocate for a form of pluralism.

In sum, the volume as a whole makes an argument not too far removed from one that would have been familiar to those engaged in debates about the ether at the end of the nineteenth century: the scientific community dragged the ether along with it as it hurtled into the twentieth century. We indeed find in these pages a strong case that the ether enjoyed a wide-ranging cultural

career that lasted well into the middle decades of the century. The more provocative claim that it enjoyed an equally vibrant epistemic career is less convincing. But the book nevertheless offers both a wise caution to look more broadly when we confront claims that a concept is defunct and a useful template for how we should think about the lives and afterlives of historical entities presumed dead.